Analysis of Redundancies in AF Retail Supply Systems

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13. ABSTRACT (Maximum 200 Words)
For years, the Air Force has operated and maintained two separate and distinct retail supply systems. The Standard Base Supply System (SBSS) is used at all base-level accounts and to a limited extent at the Air Logistics Centers (ALCs), while the D035K is used at the ALCs. This study examined the possibility of either migrating to a single retail system or developing common, shared software components to eliminate the redundancies that exist between the two systems. First, a study by Dynamics Research Corporation (DRC) is summarized and extended. Second, the results of a field test at Warner-Robins ALC are documented and discussed. Finally, recommendations are developed based on the results of the DRC study and Warner-Robins test. This report recommends developing shared software components for common functions, while depot-unique functions remain in the D035K or Stock Control System (SCS).

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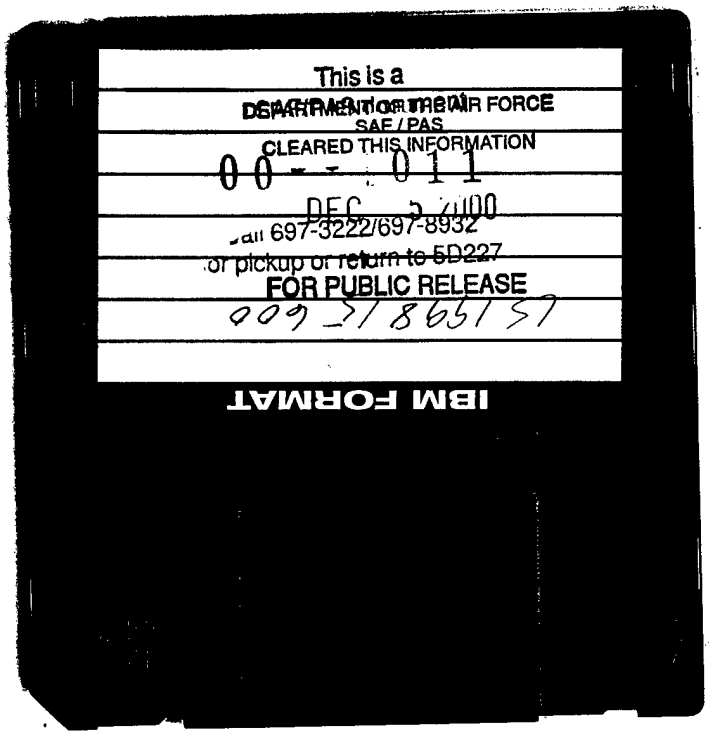
MEMORANDUM FOR AFLMA/LGS

FROM: SAF/PA

SUBJECT: Paper: Analysis of the RDO Process

Subject paper, submitted for Security and Policy Review is **cleared** for public release and placement on the web.

WALTER F. WERNER
Chief, Security Review
Secretary of the Air Force
Office of Public Affairs



EXECUTIVE SUMMARY

Problem

The Air Force currently uses two retail supply systems. The Standard Base Supply System (SBSS) manages retail stock at the base level, while the D035K system manages retail stock in support of depot maintenance at the Air Logistics Centers. The problem is determining whether this redundancy is necessary, or if a single system or shared software components can provide retail support at both the base and depot maintenance levels. From an ALC perspective, the question is primarily one of customer support. D035K has functionality that is unique to depot operations, and so any "single system" would need to contain that unique functionality. From a broader Air Force perspective, the problem also includes the costs of maintaining and operating two retail systems with redundant functionality.

Warner-Robins ALC conducted a test to determine if the SBSS can support programmed depot maintenance (PDM) requirements, which is one piece of the total functionality of D035K. The test involved supporting the PDM of a single C-5 tail number. AFMC/LG tasked the AFLMA to assist WR-ALC with this test, document the results and lessons learned, and make recommendations at its conclusion.

Background

SSG contracted with Dynamics Research Corporation (DRC), as part of the Seamless Supply initiative, to study whether the SBSS (or it's successor, the Integrated Logistics System – Supply, or ILS-S)) can replace the D035K for depot-level retail supply management. As such, the AFLMA worked closely with both WR-ALC and DRC throughout this project. Both the DRC analysis and the C-5 test provided valuable insights into the feasibility of either replacing D035K or developing common, shared software components between the two systems.

Objectives

1. To determine the *feasibility* of either migrating to a single retail system, or at least sharing common software components between two systems to reduce operating and maintenance costs. In essence, the AF needs to know if a single system or shared common software can work, and what changes need to be made to the SBSS (or ILS-S) and D035K to make it work.

2. To assist the Air Force in determining if it is *advisable* to migrate to a single retail supply system or shared software components.

Conclusions

1. Either D035K or SBSS can successfully provide depot supply (DSUP) support functions to Programmed Depot Maintenance (PDM). The two systems have virtually identical functions in this area.

2. D035K performs some (about 50%--100 of 199) depot repair (DREP) unique functions, although there are some differences in the business rules to accomplish those functions.

3. The unique DREP functions fall into 22 categories.
   a) 13 of the 22 categories represent interface requirements, while the remaining 9 are system requirements.

   b) The interface requirements represent the largest area unique to D035K and probably the most expensive and time-consuming to integrate into a single system.

4. The Air Force is modernizing both the D035K and SBSS systems. Now is a unique opportunity to eliminate the redundancies in the two systems. Any delay in a decision to reduce that redundancy could greatly increase the risk and cost of doing so at a future time.

Recommendations

1. Consolidation of all DSUP functions and common DREP functions should immediately be planned into the baselines of the two systems. Specifically, in the context of the planned "componentization" of the systems, only one program office should develop a common component, and each common component should be interoperable in both the depot and base systems. (OPR: ESC/IL)

2. For those depot-unique functions currently supported only by D035K, the Stock Control System (SCS) program office should continue its technical refresh efforts and decide in which system the components will reside. The resulting components, while being interoperable with both the depot and base systems, will be developed specifically to support depot-unique processes. (OPR: ESC/IL)

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CHAPTER 1

INTRODUCTION

PROBLEM

The original title of this project was "SBSS Replacement of D035K for Depot Retail Supply Support." During the course of researching the problem, it soon became apparent that this title reflected a somewhat biased view. The question was not one of picking one system or the other, but one of determining a solution for a complex problem. As a result, the focus shifted to determining those functions that are common to both systems, and also those that are unique to depot operations. Using this approach, redundancies can be reduced or eliminated, while maintaining necessary functionality at the depot level.

The overarching problem is that the Air Force currently uses two retail supply systems. The Standard Base Supply System (SBSS) manages retail stock at the base level, while the D035K system manages retail stock at the Air Logistics Centers. The broad problem is determining whether this redundancy is necessary, or if a single system or shared software components can provide retail support at both the base and depot maintenance levels. From an ALC perspective, the question is primarily one of customer support. D035K has functionality that is unique to depot operations, and so any "single system" would need to contain that unique functionality. From a broader Air Force perspective, the problem also includes the costs of maintaining and operating two retail systems with redundant functionality.

Warner-Robins ALC conducted a test to determine if the SBSS can provide retail supply support to programmed depot maintenance (PDM). In the process, problems and their solutions were recorded to identify D035K-unique functions (functions the SBSS does not currently perform). The test involved supporting PDM of a single C-5 tail number. AFMC/LG tasked the AFLMA to assist WR-ALC with this test, document the results and lessons learned, and make recommendations at its conclusion.

BACKGROUND

The Standard Systems Group (SSG) contracted with the Dynamics Research Corporation (DRC), as part of the Seamless Supply initiative, to identify the common and unique functional requirements between the future D035K and the Integrated Logistics System – Supply (ILS-S, the future replacement of the SBSS). Since the C-5 field test at Warner-Robins had the same goal, albeit with a smaller scope, the AFLMA worked closely with both WR-ALC and DRC throughout this project. Despite some limitations, the C-5 test provided valuable insights into the feasibility of migrating to a single retail supply system, and also into what actions will be necessary to make it happen. When combined with the DRC study, the test provides justification for the recommendations in this report.

The timing of this issue is important to note. Both D035K and SBSS are currently in the midst of technical refresh efforts, which means changes and updates are being developed

to modernize both systems. Both systems are being componentized in the process, which simply means that the computer code is written in individual and distinct components according to the functions it performs. This approach makes maintenance easier, and also makes the elimination of redundancies easier. Those functions that are common to both the D035K and SBSS/ILS-S can be rolled into single software "components" that are used by both systems, but updated and maintained by only one. This avoids duplicate maintenance cost. Timing is critical, however. If the decision is made to eliminate redundancies, changes can be made *relatively* easily at this time. If the decision is delayed, the Air Force will modernize the two retail systems independently as they exist today and it will be more costly to migrate to a single system, or shared software, at a later time.

Mr. Ronald Orr, Assistant Deputy Chief of Staff for Installations and Logistics, in a letter dated 10 May 2000, directed that "functional managers shall consider consolidating and eliminating systems, and minimizing Sustainment costs to free-up necessary resources to meet our future end states." Specific plans from each Directorate were directed by 15 June 2000, with a consolidated report to the Logistics Information Systems IPT by 30 June 2000. This study could have a direct bearing on the plans to consolidate retail supply systems.

STUDY OBJECTIVES

There were two primary objectives associated with this study:

1. To determine the *feasibility* of either migrating to a single retail system, or at least sharing common software components between two systems to reduce operating and maintenance costs. In essence, the AF needs to know if a single system or shared common software can work, and what changes need to be made to the SBSS (or ILS-S) and D035K to make it work.

2. To assist the Air Force in determining if it is *advisable* to migrate to a single retail supply system or shared software components.

In essence, the first objective attempts to address if it can be done. The second takes a broader Air Force perspective and attempts to help answer whether or not it should be done.

SCOPE

To avoid duplication with DRC's efforts, it was important to identify and define the scope of this study. The two studies were different in scope, but complementary. DRC began by comparing D035K Technical Refresh requirements found in the Requirements Definition Document (RDD) and the Design Analysis Document (DAD) for the D035 Technical Refresh initiative to the ILS-S requirements from the Software Requirements Specification (SRS). They then developed a matrix of requirements to compare the functionality of the two systems. For each D035K requirement, the ILS-S SRS was searched to find a comparable requirement. Where no comparable requirement was

found, the function was labeled as unique to D035K. Conversely, if both systems possessed a function, that function was labeled for further analysis to determine the best seamless solution. This study begins, in Chapter 2, with a deeper look into the DRC analysis, and adds some additional analysis to clarify their work.

In addition to reviewing DRC's efforts, the current study also documents the results of a field test of the concept to use the SBSS to support depot PDM. While DRC studied top-level requirements from applicable documents, Warner-Robins ALC actually "turned on" the SBSS to provide retail support to PDM of a single C-5 aircraft. This report attempts to summarize DRC's results, and compare them with those of the C-5 field test.

Because the SBSS test was conducted on a single tail number undergoing PDM, the scope of the test was limited. PDM is only one repair activity at an ALC, and is somewhat benign in terms of its interface requirements. Other repair activities (e.g. MISTR and EXPRESS) tend to be much more demanding in terms of functional requirements and interfaces. In the terms used throughout the following chapters, the C-5 test was limited to "Depot Supply," or "DSUP," functions. There are also many Depot Repair (DREP) functions performed by D035K that are beyond the scope of this test, but not beyond the broad objective of a single AF retail supply system. The lessons learned during the course of the test are from the perspective of the retail supply technicians who made it work. Chapter 3 documents the problems encountered during the test.

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CHAPTER 2

SUMMARY OF DRC REQUIREMENTS ANALYSIS

OVERVIEW

The purpose of DRC's study and AFLMA's adjustments to that study (as documented in this chapter) is to *identify and discuss those components that are unique to D035K.* ***It is not the intent of this chapter to define the scope of effort involved in merging functions***. For example, consider two functions. Suppose that one is common and the other is not. This does not indicate that 50 percent of the system is unique. One function may require hundreds of lines of code and a year to develop, while another may require considerably less. So the reader is cautioned not to equate "number of requirements" with "scope of effort."

DRC compared the functional top-level requirements for the D035K Technical Refresh to those of the ILS-S. The discussion that follows is broken into two topics: Depot Supply (DSUP) requirements and Depot Repair (DREP) requirements. Within each discussion, we summarize and rescope the DRC results to better reflect the scope of the commonality. For example, there are some requirements that actually address two functions, therefore these were counted as two separate requirements in the "AFLMA Adjustment." Conversely, many requirements are included more than once throughout the requirements documentation, so we eliminated the multiple counting in our adjustment. For a hypothetical example, what DRC counted as 7 separate requirements may have been the same requirement stated seven times, so the AFLMA Adjusted requirement would be 1.

DEPOT SUPPLY (DSUP)

DRC identified 43 DSUP requirements in the requirements documentation for the D035K Technical Refresh. Of the 43 they identified, 38 had the same functional requirement in ILS-S, while 5 were considered unique to the D035K system. The 5 D035K-unique requirements are discussed in more detail below, along with an explanation of the AFLMA adjustments.

DMAG Interface

The first D035K-unique requirement under the heading of DSUP relates to an interface with the Depot Maintenance Activity Group (DMAG), an area under the Defense Working Capital Fund (DWCF). The specific requirement reads as follows: "Interface with and support SMAG and DMAG financial accounting requirements." This requirement is largely a system interface requirement, but also has implications in the different pricing schemes used in depot maintenance. Therefore its resolution will require system changes, as well as an interface with depot financial systems. The AFLMA adjusted quantity is therefore 2, up from the 1 that DRC identified. This was

one of the problems encountered by Warner-Robins personnel involved in the SBSS test, and will be discussed in more detail in Chapter 3.

Shop Service Center (SSC)

Two requirements fall into the "Shop Service Center" category. Upon closer examination, however, the two requirements are identical. The first reads "Compute levels for SSCs," while the second reads "Compute and establish levels for assets stored in the SSCs for support of Depot Maintenance," so the "AFLMA adjusted requirements" reflect the true scope of system changes (i.e. with duplicates removed from the data).

The SSC is similar to the supply point concept used at base level in the SBSS, except that it contains additional functionality to maintain records of customer-owned stock. In an SBSS supply point, the stock is owned by supply, and the stock levels are computed off-line. In a SSC, however, the supply-owned stock levels are computed, and customer-owned stock records are also maintained. This customer-owned stock is managed by use of "Pseudo-Maintenance Inventory Centers" (Pseudo-MICs). Pseudo-MICs are essentially courtesy storage accounts that allow customers to hold stock that they've already bought but haven't used yet. So although they are similar conceptually, the Supply Point and SSC have different functional requirements unique to their particular environments.

Depot Supply Stock Fund Management

"Manage Air Force Stock Funds for the Depot Supply accounts and customer funds." This requirement relates to the SMAG requirement, which is included in both systems. As such, it is not a D035K-unique requirement.

Automated Warehouse System (AWS) Interface

"Process SBSS receipts for Automated Warehouse System (AWS)." This requirement is an interface requirement, but is outdated in that the AWS has been replaced by DLA's DSS at the three remaining Air Logistics Centers. The requirement to interface with DSS is currently in the ILS-S baseline, and so this requirement is omitted in the AFLMA adjustment.

Taking into consideration the above discussion, Table 1 shows the AFLMA adjusted requirements for DSUP.

D035K DSUP REQUIREMENT CATEGORY	NUMBER OF UNIQUE REQUIREMENTS	AFLMA ADJUSTED REQUIREMENTS
DMAG Interface	1	2
Shop Service Center (SSC)	2	1
Depot Supply Stock Fund Management	1	0
Automated Warehouse System (AWS)	1	0
TOTAL	**5**	**3**

Table 1: AFLMA Adjustments for DSUP Requirements

DEPOT REPAIR (DREP)

DRC identified 199 D035K DREP requirements in the requirements documentation. Of the 199, 100 were common with ILS-S requirements, while 99 were considered D035K-unique. Upon closer examination, 9 of the 99 requirements in the documentation actually referred to two different system capabilities. Therefore, the total number of D035K-unique requirements used as a baseline for this analysis was increased from 99 to 108. The unique requirements are summarized in Table 2 by category, and are then analyzed and discussed. Like the DSUP requirements, the duplicates have been eliminated, leaving fewer overall "AFLMA Adjusted" requirements. For example, in the DRC study there were 15 Shop Service Center requirements identified in the requirements documents. Seven of the fifteen were requirements to issue, backorder, and turn in materiel from the SSC to maintenance. The seven were therefore combined into a single requirement. The AFLMA adjusted requirements, then, provide a better picture of the scope of the differences between the two systems.

The categories in Table 2 are segregated into "Interface Requirements" and "System Requirements." System requirements are discussed individually, since they imply functional differences between the two systems. The interface requirements are discussed as a whole, however, since they constitute data passing requirements that are primarily external to the system.

D035K DREP REQUIREMENT CATEGORY	NUMBER OF UNIQUE REQUIREMENTS	AFLMA ADJUSTED REQUIREMENTS
Interface Requirements		
G004H Interface	1	1
G004C Interface	1	1
Receive Depot Repair Requirements	1	1
EXPRESS Interface	6	2
DMAG Interface	2	1
Management Items Subject to Repair (MISTR)	1	1
Automated Induction System (AIS) Interface	1	1
G402A Interface	21	1
Stock Control System Interface	2	1
G004L Interface	5	1
D035K Interface	1	1
G337 Interface	1	1
D035J Interface	2	1
Automated Warehouse System (AWS)/DSS Interface	3	0
Total Interface Requirements	**48**	**14**
System Requirements		
Due-In from Overhaul (DIOH)	15	3
Carcass Induction Requirements	3	1
Shop Service Center (SSC)	15	4
AWP Condition Code "G"	3	1
"M" Balance	1	1
Due-Out To Maintenance (DOTM)	7	0
Floating Stock/Spares	10	4
Pre-positioned wholesale backorders	1	1
Ownership Purpose Code	5	1
Total System Requirements	**60**	**16**
TOTAL D035K-UNIQUE DREP REQUIREMENTS	**108**	**30**

Table 2: DREP Requirements

SYSTEM REQUIREMENTS

There were 9 categories of system requirements identified, encompassing 16 requirements. The individual categories are discussed in more detail below. Generally we reduced the DRC requirements because they were listed multiple times.

Due-In from Overhaul (DIOH)

Three distinct requirements were identified under the category of DIOH, consolidated from 15 in the DRC study: (1) Support depot maintenance and overhaul; (2) Provide DIOH status; and (3) Update DIOH balance. All three relate to the D035K capability to recognize the DIOH process, which is similar but somewhat distinct from the DIFM process in SBSS. The DIOH process is used to track end items undergoing overhaul at the depot. The status of the overhaul is periodically updated, and all required parts are ordered against the end item's DIOH document number. Interfaces with several depot systems support the process. In terms of the system, the process is very similar to "C-deck" issues in SBSS, where a part is issued to a backshop for repair, but no DIFM data is accumulated. So although the DIOH is unique to the depot and D035K, it is probable that the C-deck function could provide a similar capability.

Carcass Induction

D035K has the capability to receive data and updates as carcasses are automatically inducted into repair based on MISTR or EXPRESS requirements. Since these processes are unique to depot-level repair, SBSS does not currently have this capability.

Shop Service Center (SSC)

The SSC is the "standard materiel support function for depot maintenance in AFMC." It manages, among other things, a Maintenance Inventory Center (MIC) containing forward-stored parts to expedite repair actions. Three types of "courtesy storage" accounts can also be established in a MIC. Y-MICs are used to store unused consumable items owned by maintenance; X-MICs are used to store components awaiting parts, or "AWP" components; and Z-MICs are used to store local manufacture components. The MIC also supports stock levels, if authorized, although the courtesy storage "pseudo-MICs" do not. Although the MIC is very similar to a Supply Point in SBSS, the courtesy storage entities are unique. The requirement is therefore not fully supported by SBSS.

AWP Condition Code "G"

A Condition Code "G" is applied to an item when it enters AWP status and the first part is ordered against the work order. The end item is held in supply until the component parts are available. The code identifies AWP items to D035K, which can then tie backorders to the correct component until all parts have been received. When the final part has been received, the component is then re-inducted into repair. This requirement is unique to D035K.

"M" Balance

The "M" Balance is related to the AWP Condition Code "G," in that it is simply a count of those items coded "G" in D035K. Again, this requirement is a unique D035K capability.

Due-Out To Maintenance (DOTM)

A DOTM record is established in D035K to record those instances when maintenance has turned in a reparable item but has not received a like replacement part due to unavailability. D035K therefore backorders the item against the issue request document number. This functionality is a simple extension of a standard SBSS due-out and credit DIFM process, and so the AFLMA adjusted requirement is 0.

Floating Stock/Spares

Floating stock/spares is another depot-unique management practice supported by D035K. Floating stock is made up of XD2 items used as buffer stock for end items whose subassemblies have repair times that exceed the repair time of the end item. It therefore prevents delays in the repair of the end item. Floating spares, on the other hand, are test equipment components (also XD2) which are carried to defer supply delays on test equipment. Its intent is to avoid equipment down time and therefore reduce end item repair time. As floating stock and spares are not used at base level, the SBSS does not explicitly contain the requirement. However, Special Purpose Recoverables Authorized Maintenance (SPRAM) in the SBSS are identical to floating spares, and are managed similarly to both floating spares and floating stock.

Pre-positioned wholesale backorders

Pre-positioned wholesale backorders are requisitions from the field for wholesale assets. When an item finishes the repair process and is turned in serviceable, the system will automatically ship the item to satisfy an existing base-level requirement, if one exists. The D035K system is coded to recognize and process these items, while SBSS is not.

Ownership/Purpose Code

The ownership/purpose code is a code that identifies, as the name implies, the owner of an item and the purpose for the stock. Although identified by DRC as a D035K-unique requirement, the SBSS contains this function. Minor system changes may be necessary to change the way in which it is used in a depot facility, however.

INTERFACE REQUIRMENTS

Table 3 lists the various system interface requirements identified by DRC from the requirements documentation, by system designator and system name. Although interfaces are generally external to the system, developing a large suite of interfaces can

be costly and time-consuming. In fact, the sheer number and complexity of required interfaces seems to be the biggest perceived impediment to migrating to a single system.

SYSTEM DESIGNATOR	SYSTEM NAME
G004C	Depot Maintenance Workload Planning and Control System
EXPRESS	Execution and Prioritization of Repair Support System (EXPRESS)
DMAG	Depot Maintenance Activity Group
AIS	Automated Induction System
G402A	Exchangeables Production System (EPS)
D035	Stock Control System (SCS)
G004L	Job Order Master Production System (JOMPS)
D035K	Wholesale and Retail Receiving and Shipping System (WARRS)
G337	Inventory Tracking System (ITS)
D035J	Financial Inventory Accounting (FIA) System
D060	Automated Warehouse System (AWS)
G004H	Maintenance Actual Material Cost System
G019C	Management Items Subject To Repair (MISTR) Requirements System

Table 3: D035K Interface Requirements

CHAPTER 3

C-5 FIELD TEST RESULTS

OVERVIEW

The SBSS field test at Warner-Robins ALC was limited in scope to a single C-5 aircraft passing through the PDM line at its facility. Special levels were established in the SBSS based upon demands experienced at the San Antonio ALC for the same weapon system, factored down proportionally to derive an estimated level for a single aircraft. The PDM process then proceeded normally from a maintenance perspective, but parts were ordered from the SBSS instead of the D035K.

Objective (1), determining the feasibility of a single supply system, was primarily met by SBSS personnel at Warner Robins ALC. The Warner Robins supply squadron has a team of dedicated technicians that developed the interfaces and manual work-arounds to make the SBSS work for PDM support. Throughout this process, detailed documentation was required for each problem encountered and the ultimate solution for each. This process was coordinated closely with C-5 maintenance, stock fund, DLA, HQ AFMC, and AFLMA personnel on a weekly basis. Chapter 3 is dedicated to the documentation of those problems and solutions identified throughout the test.

Warner Robins ALC began planning a "field test" using the SBSS to support Programmed Depot Maintenance (PDM) in 1998. The original intent was to prove that the concept of supporting PDM with the SBSS could work in practice. In the early planning stages, the scope of the test was reduced to a single C-5 aircraft. Although efforts were made to set up a meaningful test plan with exit criteria, the methodology and scope of the test precluded any reliable results when comparing the supply support of SBSS with that of D035K. For example, the SBSS was not allowed to generate levels using existing business rules in the system. Instead, C-5 PDM demand data from San Antonio ALC was used to determine the required parts, and those parts were loaded with appropriate special levels in SBSS. Additionally, the D035K was still being used to support the remainder of C-5s in PDM at the time, therefore the SBSS had a "safety net" to fall back on for supply support if the need arose. Thus, an "apples to apples" comparison would be difficult at best, and erroneous at worst. Instead, the focus of the test shifted to making the system work throughout the PDM process, while documenting all shortfalls experienced along the way. In this way, it was hoped that the actual system deficiencies could be identified and distinguished from differences in the top-level system requirements identified by DRC.

The following paragraphs summarize the major system problems encountered by Warner-Robins SBSS personnel in trying to support the PDM line via SBSS. Many of the problems were expected, since SBSS was not designed with the interfaces necessary to communicate with other depot-level systems. A number of problems experienced are not

included in this report, since they were primarily procedural or training-related in nature, and therefore are outside the scope of this project.

RESULTS

1. The largest single problem encountered by SBSS personnel during the test was the lack of interface between the SBSS (called the D002A at the ALCs) and the G004H Maintenance Cost Accounting System. The interface between G004H and SBSS, referred to as the F09 interface hereafter, was inadequate throughout the test. Several detailed examples are noted below for illustration.

   A. The Budget Code "9" Resource Control Center (RCC, in the Supplementary Address field) was not being input into issue requests and turn-in documents correctly, and some organizations were inputting other data into the supplementary address field. Although this could be considered a training problem, the RCC needs to be included in the ISU and TIN transactions, and needs to correctly overlay to the F09 interface with the financial systems. Automating this process will ensure the RCC is correctly loaded. This can be done by programming the F09 to select the correct RCC from the Organizational Cost Center Record (OCCR) using the Organization Code in the document number. SBSS personnel had to use 1PU transactions during the test to create correct F09 images for issues and turn-ins.

   B. A similar problem was experienced for Budget Code 8 items, but the Budget Code 8 problem is slightly more complex because of the pricing rules used in depot maintenance. SBSS uses the item record (latest acquisition) cost by default, whereas depot maintenance uses an "actual" cost to charge the customer. Therefore, SBSS personnel had to use 1PU transactions to create correct F09 images for issues and turn-ins. Like in the case of Budget Code 9 items, the TIN transaction does not overlay the Supplementary Address and Mark For fields to the transaction history, so this data is not passed to the F09 interface.

   C. Warner-Robins recommends the following solution to the problem with the F09 interface: creation of new PDM ISU and TIN screens that contain the following additional fields. (These fields must overlay to the transaction history record)

NAME	FIELD LENGTH
Resource Control Center (RCC)	5
Cost Code	1
Control Number	6
Job Order Number Suffix	3
Operation Number	5

2. Supply personnel also had problems passing cannibalization/rob data between D035K and SBSS. This was largely the result of using two systems simultaneously, however.

For example, parts that were robbed from an aircraft being supported by D035K to be used on the SBSS-supported aircraft must be properly reported in both systems. Backorders must be transferred to the "robbed" aircraft from the "robbing" aircraft, and vice-versa. This proved to be a time-consuming effort during the field test, but will not be an issue if a single system is used.

3. A great deal of time was spent manually updating local manufacture status in the SBSS, since there is not an automated link between maintenance systems and SBSS. Because of the sheer volume of local manufacture at a depot, this is an issue that must be addressed. Interestingly, importing the local manufacture status into D035K is also largely manual at this time.

4. As mentioned in Chapter 2, the SBSS contains no capability to track customer-owned assets in the courtesy storage accounts ("pseudo MICs"). Although not a major problem during the field test because D035K was still available to track these assets, it would nonetheless be a problem if a single system were used.

DISCUSSION OF FIELD TEST RESULTS

The lessons learned during the Warner-Robins field test are consistent with expectations, given the results of DRC's analysis. Although a great deal of effort was needed to overcome training, procedural, and interface problems, there were no show-stoppers *for this test*. The retail supply system primarily performs Depot Supply, or "DSUP" functions during PDM, and most of these DSUP functions are common to both the SBSS and D035K. These functions include such things as ordering, issuing, and receiving parts; maintaining balances and warehouse locations; and computing stock levels. As noted in Chapter 2, only a couple of DSUP functions are unique to the D035K, and it was these areas that were identified as problems in the field test. The one exception is in the area of local manufacture, which was not identified in the DRC analysis but nonetheless caused a great deal of work for SBSS personnel throughout the test.

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CHAPTER 4

DISCUSSION

FEASIBILITY

We now conclude with a discussion of the results presented in the previous two chapters in the context of the project objectives. The first objective was to determine the *feasibility* of migrating to a single retail system for both base and depot operations. Given that the C-5 test was extremely limited in scope, it is impossible to say conclusively *based on the test results alone* that it is feasible to migrate to a single system. Several of the test's limitations support this conclusion: (1) Supply support was not measured, since adjusted stock levels were used in lieu of computed levels; (2) D035K was still operating during the test, so functions like the Shop Service Center were available even though they are not included in SBSS; (3) Several problems were actually created (like the problem of cannibalizing off of a D035K jet to support the SBSS jet) because both systems were running concurrently that would not occur if only one system was in operation; and (4) The test only dealt with a portion of depot repair activity. From the test one could conclude that the SBSS could be modified to support PDM, that is the DSUP functions. However to eliminate D035K completely would require significant changes and the development of many interfaces. The AF could not modify the SBSS to accommodate complete D035K functionality *in the near term*: the AF has neither the time (prior to ILS-S) nor the resources in the near term.

Although the test did not prove conclusively that it is feasible to migrate to a single retail system for all D035K's functions in the near term, it did show that it is feasible to share certain parts of the systems. Based on the findings of the DRC study and the field test at Warner-Robins ALC, the systems can certainly *share at least some common components*. Given this discussion, the next question to answer is whether or not it is *advisable* to either migrate to a single system or to share components.

A SINGLE SYSTEM VS. SHARED COMPONENTS

It is not the intent of this report to advocate one system or the other. The overlying issue is that redundancies exist in the two systems, which may be wasteful in terms of system maintenance and operations. For example, at Warner Robins ALC, there are over 600 personnel employed in the operation of the D035K account. Over 100 personnel are likewise employed operating the SBSS account. Clearly, a simple reduction in the redundancies in the two systems could have a positive effect on the efficient use of manpower. From a software maintenance standpoint, a similar redundancy exists. Personnel at the Materiel Systems Group (MSG), including contractors, are employed in the maintenance and update of D035K software. Likewise, personnel at the Standard Systems Group (SSG) maintain the SBSS software. Again, a reduction in the redundancies stands to reduce wasteful spending, and remove some of the "seams" between wholesale and retail accounts.

From a DSUP perspective, the effort to migrate to the SBSS would be minimal. This effort primarily involves developing a few interfaces that currently do not exist. With DREP functions, however, extensive system interface work would need to be done to ensure full functionality. As noted in Chapter 2, fourteen interface requirements were identified in the requirements documents as unique to D035K. Given the sheer number of depot systems currently in use, this number should be viewed cautiously. It is likely that more interfaces would be required than were identified in the documents. This in itself would tend to make the effort long-term. In addition to the interface requirements, system functionality would need to be included in the "single system" in order to maintain current depot capabilities.

The discussion above leads back to the question of whether or not it is advisable to either migrate to a single system or shared components. Given that the scope of effort to migrate to a single system will be large and risky *for some functions and interfaces*, the logical solution to eliminating seams and redundancies between the two systems is to share common components. This approach will have the desired effect in reducing long-term recurring cost and manpower, while reducing the one-time cost and risk of migration. The end result should be a common, interoperable set of software components that are used at both the depot and base level (although some will be unique to each).

Timing for this effort is critical. With both systems undergoing technical refresh initiatives, the decision to develop a set of common, shared components *at this time* will not add significant cost or risk to either system. As the refresh initiatives mature, the cost and risk of implementing this approach will grow. The result of a failure to act immediately will undoubtedly be the continuation of two independent and redundant systems being operated and maintained well into the future.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

1. Either D035K or SBSS can successfully provide depot supply (DSUP) support functions to Programmed Depot Maintenance (PDM). The two systems have virtually identical functions in this area.

2. D035K performs some depot repair unique functions (about 50%--100 of 199). The remaining functions (99 of 199) are common, but there are some differences in the business rules to accomplish those functions.

3. The unique functions fall into 22 categories.

   a) 13 of the 22 categories represent interface requirements, while the remaining 9 are system requirements.
   b) The interface requirements represent the largest area unique to D035K and are probably the most expensive and time-consuming to integrate into a single system.

4. The Air Force is modernizing both the D035K and SBSS systems. Now is a unique opportunity to eliminate the redundancies in the two systems. Any delay in a decision to reduce that redundancy could greatly increase the risk and cost of doing so at a future time.

RECOMMENDATIONS

1. Consolidation of all DSUP functions and common DREP functions should immediately be planned into the baselines of the two systems. Specifically, in the context of the planned "componentization" of the systems, only one program office should develop a common component, and each common component should be interoperable in both the depot and base systems. (OPR: ESC/IL)

2. For those depot-unique functions currently supported only by D035K, the Stock Control System (SCS) program office should continue its technical refresh efforts and decide in which system the components will reside. The resulting components, while being interoperable with both the depot and base systems, will be developed specifically to support depot-unique processes. (OPR: ESC/IL)

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